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SUPPLEMENTATION TO THE ENCYCLOPEDIA

Endoscopic Removal of an Impacted Needle with Syringe from the Esophagus ☆

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KEYWORDS
Esophagus;
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Video;
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Abstract
Background: In adults, non-food foreign body ingestions occur more in denture users, incarcerated individuals, and in patients with psychiatric disorders or alcohol intoxication. The majority of the ingested foreign body will pass spontaneously. Sharp or pointed foreign body, animal or fish bones, and magnets increase the risk of perforation.
Patient: An incarcerated patient with bipolar disorder swallowed a 14 cm in length needle attached with a syringe three months prior to presentation. The needle penetrated the distal esophagus leading to mediastinitis.
Methods: In this video manuscript, we demonstrated endoscopic techniques on how to remove this 14 cm long sharp object.
Results: The foreign body was removed uneventfully and mediastinitis resolved with antibiotic treatment.
Conclusions: Emergent endoscopy is indicated in (1) esophageal obstruction and the patient are unable to swallow secretions and (2) disk batteries and sharp-pointed foreign body in the esophagus.

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Video related to this article

Video related to this article can be found online at http://dx.doi.org/10.1016/j.vjgien.2014.08.001.

1. Background

- Emergent endoscopy is indicated in esophageal foreign body and food impactions.
- If the ingested objects are long and rigid with sharp or pointed end, endoscopic removal can be challenging.

2. Patient and methods

- A 36-year-old incarcerated man with bipolar disorder presented with swollen neck, crepitus, fever, and leukocytosis.
- The patient admitted swallowing a needle attached syringe three months ago on February 14. Since then, he noted intermittent solid food esophageal dysphagia and odynophagia.
- Computerized tomography of the chest and neck showed significant pneumomediastinum (Figure 1).
- A barium contrast swallow study revealed a needle attached syringe in the esophagus and stomach and without contrast extravasations (Figure 2). The foreign body was "refluxing" (moving inside and outside) in the esophagus when radiologist changed the patient body position from supine to erect.
- Emergent upper endoscopy was successfully performed and the procedure is described below.

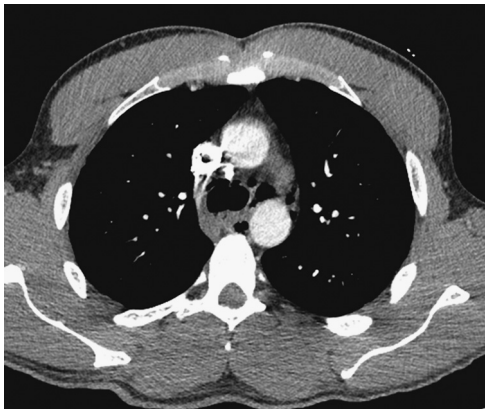

Figure 1 A selected image from computerized tomography of the chest showing the pneumomediastinum.

3. Study materials, endoscopic equipment and devices

- Diagnostic gastroscope (Olympus GIF-H180, Olympus America, Center Valley, PA).
- Foreign body hood protector (Kimberly-Clark, Roswell, GA).
- Banding device cap (Six-Shooter®, Cook Medical, Winston-Salem, NC).
- Endoscopic grasping device (Raptor™, US Endoscopy, Mentor, OH).

4. Endoscopic procedure

- During emergent endoscopy, a needle attached syringe was seen in the mid and distal esophagus (Figure 3A-C). The needle had penetrated the esophagus just above the gastroesophageal junction.
- Using an endoscopic grasping device, the needle was withdrawn from the esophageal wall and dragged into the stomach with the attached syringe.

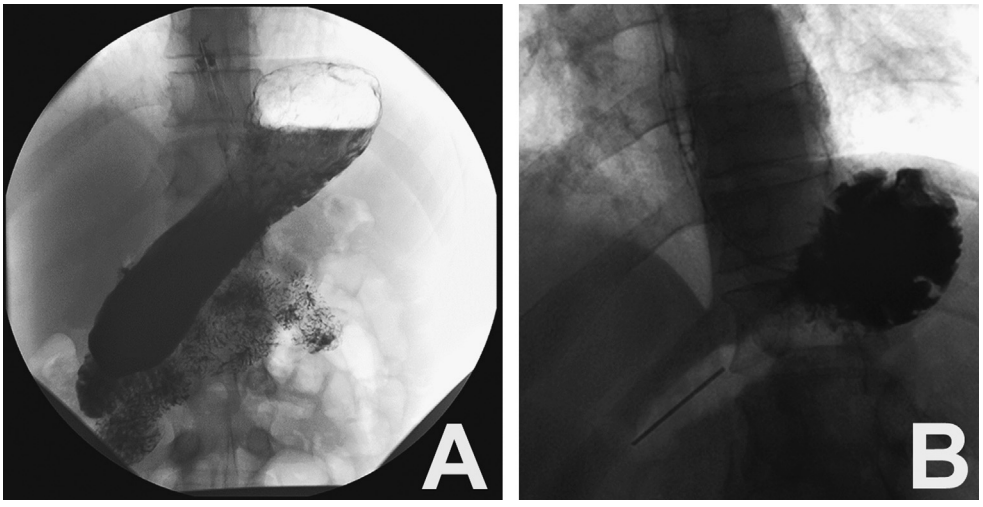

Figure 2 Selected fluoroscopic images from the barium swallow study showing a needle attached syringe inside the esophagus with the needle pointed downward (A). The foreign body was "refluxing" (moving inside and outside) in the esophagus (A and B) when radiologist changed the patient body position from supine to erect.

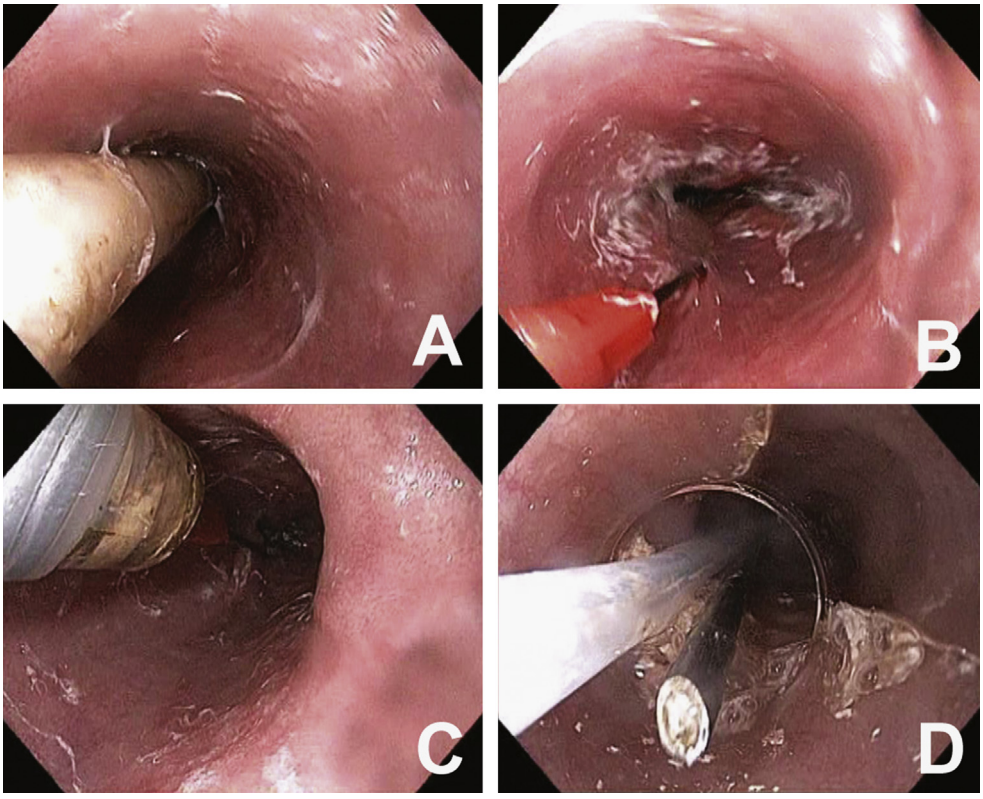

Figure 3 Endoscopic images showing the syringe part of the ingested foreign body inside the mid and distal esophagus (A), punctured needle in the distal esophagus (B), the needle is firmly attached to the syringe (C), an endoscopic snare firmly grasped the needle hub with the pointed needle facing inside the attached endoscopic cap (D).

- Initially, we attempted to grasp the needle with an endoscopic snare with a foreign body hood protector attached to the tip of the gastroscope. Repeated attempts failed due to slippery grip on the needle shaft by the snare and the floppy nature of the hood protector.
- A plastic banding device cap was then attached to the tip of the endoscope. The opened snare was advanced over the ensnared needle shaft in order to grasp the needle hub. The needle hub was firmly ensnared with the tip of the needle pointing inside the plastic hood (Figure 3D).
- The gastroscope was slowly withdrawn and the grasped needle attached syringe was removed through the esophageal introitus, pharynx, and mouth.

5. Results

- The removed needle and syringe was measured 14 cm in length.
- The patient was treated with antibiotics for mediastinitis and was discharged.

6. Discussion

In adults, accidental foreign body (FB) ingestion tends to be food (meat) bolus. Non-food object ingestions occur more in denture users, and in those with psychiatric disorders, alcohol intoxication, and incarcerated individuals [1-6]. Once through the esophagus, most FB including sharp objects pass uneventfully. Sharp or pointed FB, animal or fish bones, and magnets increase the risk of perforation.

Commonly used foreign body retrieval devices are the following: net retriever; snare; retrieval basket grasping device; pronged grasping device; rat tooth, shark tooth; and rat tooth alligator jaw [1,6]. For sharp or pointed objects, snare and basket probably offer the firmest grip followed by the grasping devices. In addition, commonly used over-the-scope devices for mucosa and/or airway protection include foreign body hood protector, banding device cap, friction-fit cap, and endoscopic overtube. In removing needles, the pointed end should be grasped and shielded inside a plastic cap or rubber hood during removal. This minimizes the risk of perforation and mucosal injury. That is why we did not grasp the syringe end for removal, although it is much easier to ensnare this end. In this case with a long sharp object, the rubber hood protector is too soft for a firm grip. The plastic banding device cap is strong enough to keep the pointed needle inside the cap while the snare is holding on the needle shaft or hub. Another lesson from this case is that the endoscopist needs to ensnare the needle hub for a firm grip during removal if the needle is attached to the syringe. We do not recommend using endoscopic overtube if the FB is very long, rigid, and sizable. The ensnared FB is unlikely to be withdrawn into the semi-rigid overtube and pass the esophageal introitus and pharynx. In the English medical literature, there are several cases of endoscopic

removal of the ingested needles [7–10]. In one report, the endoscopists grasped and withdrew the needle inside a plastic sheath through the endoscopic channel before withdrawing the endoscope [8]. If endoscopic removal fails and complication develops, the needle can be removed through laparoscopy or laparotomy [11].

7. Take-home messages

- The majority of the ingested FB will pass spontaneously.
- *Esophageal FB*
  Emergent endoscopy is indicated in
  (1) Esophageal obstruction and the patient is unable to swallow secretions.
  (2) Disk batteries and sharp-pointed FB in the esophagus.

  Urgent endoscopy (<24 h) is needed for esophageal FB and food impactions without complete obstruction.
- For sharp or pointed objects, snare and basket probably offer the firmest grip followed by the grasping device.
- Commonly used over-the-scope devices for mucosa and/or airway protection include foreign body hood protector, banding device cap, friction-fit cap, and endoscopic overtube.
- In removing needles, the pointed end should be grasped and shielded inside a plastic cap or rubber hood during removal.
- The endoscopist needs to ensnare the needle hub for a firm grip during removal if the needle is attached to the syringe.

8. Scripted voiceover

A 36-year-old incarcerated man with bipolar disorder presented with swollen neck, crepitus, fever, and leukocytosis. The patient admitted swallowing a needle attached syringe three months ago. Since then, he noted intermittent solid food esophageal dysphagia and odynophagia. CT scan of the chest and neck shows a significant pneumomediastinum. A barium contrast swallow study reveals a needle attached syringe in the esophagus and stomach. There are no contrast extravasations. The foreign body is moving inside and outside in the esophagus when the radiologist changed the patient body position from supine to erect. During emergent endoscopy, a needle attached syringe is seen in the mid and distal esophagus. The needle had penetrated the esophagus just above the gastroesophageal junction. Using an endoscopic grasping device, the needle is withdrawn from the esophageal wall and dragged into the stomach with the attached syringe. With an endoscopic snare, the needle and syringe is completely removed from the esophagus into the stomach. This is a foreign body hood protector. We attach the hood protector to the tip of the gastroscope. We attempt to grasp the needle with an endoscopic snare. Repeated attempts failed due to slippery grip on the needle shaft by the snare and the floppy nature of the hood protector. A plastic banding device cap is then attached to the tip of the endoscope. We are attempting to remove the needle and syringe with the endoscopic snare grasping the needle shaft.

The tip of the needle is pointing inside the plastic cap. Unfortunately, the snare slipped due to the long, rigid, and large size of the foreign body. This time, the opened snare is advanced over the ensnared needle shaft in order to grasp the needle hub. The needle and syringe is now firmly secured. The entire foreign body is being removed. The needle and syringe is measured 14 cm in length. For sharp or pointed objects, snare and basket probably offer the firmest grip followed by the grasping device. In removing needles, the pointed end should be grasped and shielded inside a plastic cap or rubber hood during removal.

Human and animal rights

All authors certify that this work described in our article has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans http://www.wma.net/en/30publications/10policies/b3/index.html and uniform requirements for manuscripts submitted to Biomedical journals http://www.icmje.org.

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Conflict of interest

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